

Danfoss Drives

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To Whom it May Concern;

The Trane variable frequency drive (VFD) is manufactured by Danfoss Power Electronics, the world's largest manufacturer of HVAC VFD's. They meet or exceed industry standards for variable frequency drives on a global basis. The following pages list the national and international standards that were observed during the design of the product.

Trane Drives, as manufactured by Danfoss, have been used globally for over twelve years in every imaginable HVAC/R application with great market acceptance. There are over 350,000 Trane Drives installed globally in every type of HVAC/R application.

TR200/TR150 VFDs have been rigorously tested and qualified by Trane, to Trane's exacting standards for quality, reliability and dependability. They are designed and tested for applications in Trane's OEM AHUs, Chillers and other variable speed products. They are further field tested and qualified for self-standing VFD applications for renovation, retrofit and new construction projects.

The Trane drive is sold by trained Trane sales engineers and is supported by over 5,000 trained technicians nationwide. It is also supported by the Danfoss Technical Support Group and a staff of Trane dedicated personnel.

Trane Drives are backed by one of the industry's strongest warranty programs and one of the largest service and parts organizations in the world - Trane Service and Trane Supply.

If you have any questions about the Trane Drive, we are available to help.

Respectfully submitted,

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Danfoss Drives,
National Accounts Manager for Trane
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Quality, Environment and Safety

Certificate of Conformity

The below listed national and international directives/standards were observed during the design of the VLT® HVACDrive series FC-102, VLT® AQUA Drive series FC-202 and VLT® AutomationDrive series FC-301 & FC-302

Directive/standard/norm	Description
73/23/ECC (EN 61800-5-1 as preferred safety standard)	LOW VOLTAGE DIRECTIVE
EN 61800-5-1 Part 5-1:	Adjustable speed electrical power drive systems - Safety requirements – Electrical, thermal and energy
EN 50178	Electronic equipment for use in power installations
section 9.4.1 to establish compliance with the following sub clauses:	Visual inspections
• 5.2.1	Requirements for protections against electric shock
• 5.2.2	Protection against direct contact
• 5.2.4	Protection by means of enclosures and barriers
• 5.2.4.1	Distances
• 5.2.8.3	Protection by means of protective impedance
• 5.2.8.4	Protection by using limited voltage in control circuits
• 5.2.9	Protection with regard to indirect contact
• 5.2.9.1	Insulation between live parts and exposed conductive parts
• 5.2.9.2	Protective bonding
• 5.2.14	Solid insulation, insulation of circuits
• 5.2.15.1	Clearances and creepage distances
• 5.2.18.1	Constructive measures
• 5.3	Requirements for EE in installations with regard to protection against electric shock
• 5.3.1	Protection with regard to direct contact
• 5.3.1.2	Connection of EE with protective separation
• 5.3.2	Protection with regard to indirect contact
• 7.1.8	Electrical connections
• 7.2	Marking, identification, documentation
section 9.4.2.1 (EN60068-2-2, test Bd /IEC 60068-2-2, test Bd)	Dry heat test
section 9.4.2.2 (HD 323.2.3 S2, test Ca/ IEC 60068-2-3, test Ca)	Damp heat steady state
section 9.4.3.1 (EN 60068-2-31, test Ec/IEC 60068-2-31, test Ec)	Topple test
section 9.4.3.2 (EN 60068-2-6, test Fc/IEC 60068-2-6, test Fc)	Vibration, sinusoidal
section 9.4.4.2 (EN 60529/ IEC 60529)	Non-accessibility test
section 9.4.4.3 (EN 60529/ IEC 60529)	Enclosure test
section 9.4.5.1 (HD 588.1 S1/ IEC 60664-1)	Impulse voltage test
section 9.4.5.2	AC or DC voltage test
section 9.4.5.3 (HD 625.1 S1)	Partial discharge test
section 9.4.6.1 (see under EMC Directive)	Emission of EMC disturbances
section 9.4.6.2 (see under EMC Directive)	Immunity from EMC disturbances
section 9.4.6.3	Short-circuit withstand capability

Quality, Environment and Safety

89/336/EEC (EN61800-3/ IEC61800-3 as preferred standard)

EN61800-3/ IEC61800-3

EN/IEC61600-6-3/4

EN 55011

EN 55011

EN 55011

EN/IEC61600-6-1/2

EN 61800-3/IEC61800-3

EN 61000-4-2 (IEC 61000-4-2)

EN 61000-4-3 (IEC 61000-4-3)

EN 61000-4-4 (IEC 61000-4-4)

EN 61000-4-5 (IEC 61000-4-5)

EN 61000-4-6 (IEC 61000-4-6)

EN 61800-3 (IEC 61800-3)

IEC 61000-2-4

IEC 60146-1-1

IEC 61000-2-4

IEC/EN61000-4-11

IEC 61000-2-4

IEC 61000-2-4

EN 61800-3/ (IEC 61000-3)

EN 61000-3-2 (IEC 61000-3-2)

EN 61000-3-12 (IEC 61000-3-12)

UL 508c

Enclosure Construction

section 6 (UL 50)

Environmental Rating Related Enclosure Construction

section 7 (UL 50)

section 8 (UL 50)

Environmental Rating Related Enclosure Performance

section 9 (UL 50)

Non-Environmental Rating Related Enclosure Performance

section 10

section 11

Instructions and Marking Pertaining to Enclosures

section 12

section 13

Device Construction

section 14

section 15

section 16

section 17

section 18

section 19

section 20

section 21

section 22

section 23

section 24

EMC DIRECTIVE

Emission PDS Product Standard

Emission- public/industry

Conducted Class A-1

Conducted Class B-1

Radiated Class A-1

Immunity- public/industry

Immunity Industri

Electrostatic discharge (ESD)

Electromagnetic radiated field, A.M. modulated

Burst transients

Surge transients

RF field, common mode

Low frequency immunity

Harmonics

Commutation notches

Voltage variations and fluctuations

Voltage dips and short interruptions

Voltage unbalance

Frequency variations

Low frequency emission

Harmonics ($I \leq 16A$)

Harmonics ($I > 16A$)

Safety for Power Conversion Equipment

Frames and Enclosure

General

Protection against corrosion

General

General

Securement of snap-on cover test

Permanence of marking
details

General

Protection against corrosion

Provisions for Mounting

Insulation Material

Means for switching

Live Parts

Drive Protection

Capacitors

Fuseholders

Internal wiring

External Interconnections

Quality, Environment and Safety

section 25
section 26
section 27
section 29
section 30
section 32
section 35
section 36 (UL840)
section 37
section 38

Device Performance

section 39

UL 508c

section 40
section 41
section 41.1
section 41.3
section 41.4
section 41.6
section 42
section 43
section 44
section 45
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section 50
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section 54

Device Marking

section 55
section 56
section 57
section 60
section 61
section 62
section 63

Manufacturing and production line test

section 64

CAN/CSA-C22.2 No. 14-95 (approved by UL)
CAN/CSA-22.2 No. 0.15-95

Transformers
Blower Motors
Supply Connections
Risk of Electric shock
Risk of Fire
Secondary Circuits
Isolation Devices
Spacings
Grounding
Accessories

General

Safety for Power Conversion Equipment

Temperature
Abnormal operation tests
General
Single phasing
Inoperative blower motor
Current limiting control
Full-load motor-running current tables
Solid state motor overload protection test
Dielectric voltage withstand test
Short circuit test-standard fault currents
Transient-voltage-surge suppression test
Brake down of components test
Terminal torque test
Rating

General

Overload, Over current, Over speed
Branch circuit short circuit protection
Wiring terminal markings
Cautionary markings
Instructions and markings pertaining to accessories
Marking location

Circuit functionality evaluation

Industrial Control Equipment

Adhesive Labels

Quality, Environment and Safety

Miscellaneous standards/norms:

Danfoss Corporate Guideline: 500B0430
and ISTA, procedure 1A and 1
Danfoss Corporate Guideline: 500B0432,
Sinus Vibration, curve V (IEC 68-2-6, test Fc)
Random vibration, curve E / F
IEC 60068-2-64
VDE 0160
EN 50178 (section 5.2.11)
EN50178 (section 6.1, table 7)(IEC 721-3-3)

EN 50178 (section 6.1, table 7)(IEC 721-3-1)

EN 50178 (section 6.1, table 7)(IEC 721-3-2)

VBG-4

Functional Safety:

ISO/EN 13849-1:2006 (former EN 954-1)

EN 954-1:1996
IEC 61508-1:1998, IEC61508-2:2000

EN 61800-5-2:2007

EN 62061:2005
EN 60204-1

Guideline for Transportation test
(Packaging)
Guideline for Vibration test
Vibration, Sinus
Vibration, Random
Vibration, random, broad-band
Mains transients test pulse, class 1/2
Leakage current and fault current
Temperature (Class 3K3), Relative humidity
(Class 3K3), Air pressure (Class 3K3)
In Storage: Temperature (Class 1K4), Relative
humidity (Class 1K3), Air pressure (Class 1K4)
During transportation: Temperature (Class 2K3),
Relative humidity (Class 2K3), Air pressure
(Class 2K3)
Direct touching

Safe Stop function, PL d ($MTTF_d = 24816$ years,
DC=99,99%, Category 3)
Safety Category 3
Safe Stop function, SIL 2 (PFH= $\lambda_{du} = 7e^{-10}$ FIT,
 $\lambda_{dd} = 3.9$ FIT, $\lambda_s = 1.54$ FIT, SFF > 99%, HFT=0)
Safe Stop function conforms with STO – Safe Torque
Off, SIL 2 Capability
Safe Stop function, SILCL 2
Stopping Category 0, Unintended Restart Protection

The conditions for observing the above mentioned directives/standards/norms, see the Operation Instruction or Design Guide for the specific product series.

Issued by:



Lars Erik Donau
Quality Systems Manager